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Zygosporium verruciferum sp. nov., on *Solanum lycopersicum* from Venezuela

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Abstract — *Zygosporium verruciferum* is described and illustrated as a new species distinguished by its conspicuous and distinctive verrucose hyphae; its setiform conidiophores, which are verrucose and dark brown at the base, and smooth, globose and subhyaline toward the apex; and its unicellular; ellipsoidal, subhyaline conidia.

Key words — asexual fungi, hyphomycete, tomato

Introduction

The genus *Zygosporium* Mont. is characterised by development of darkly pigmented, incurved vesicular cells, which may develop on a setiform conidiophore or arise directly from the mycelium. the cell vesicle gives rise to 2–4 ampulliform conidiogenous cells; and the conidia are unicellular, hyaline to brown, smooth or variously ornamented, and ellipsoid, globose or ovoid (Hughes 1951, Ellis 1971, Whitton et al. 2003, McKenzie et al. 2007).

During investigations on a greenhouse *Solanum lycopersicum* (tomato) crop in Miranda State, Venezuela, a fungus representing the genus *Zygosporium* was observed. It differs morphologically from previously described species and is therefore described as a new species.

Materials & methods

Sepals of *Solanum lycopersicum* were collected from plants grown in a greenhouse and taken to the laboratory in sterile plastic bags. Samples incubated at 25°C in Petri dishes were placed inside 8 L plastic moist chambers containing 32 ml sterile water and

0.32 ml glycerol (Castañeda-Ruíz 2005) for 24h. Mounts were prepared with glycerin and with hydrous lactophenol 1:1, and examination and measurements were made at a magnification of 2000×. Micrographs were obtained with a Nikon D810 camera attached to a standard Carl Zeiss microscope and duplicator. Type specimens were deposited at National Herbarium Venezuela, Universidad Central de Venezuela, Caracas, Venezuela (VEN), and herb. L. Lucena, Caracas, Venezuela (CLL).

Taxonomy

Zygosporium verruciferum L. Lucena **sp. nov.** Figs 1–7

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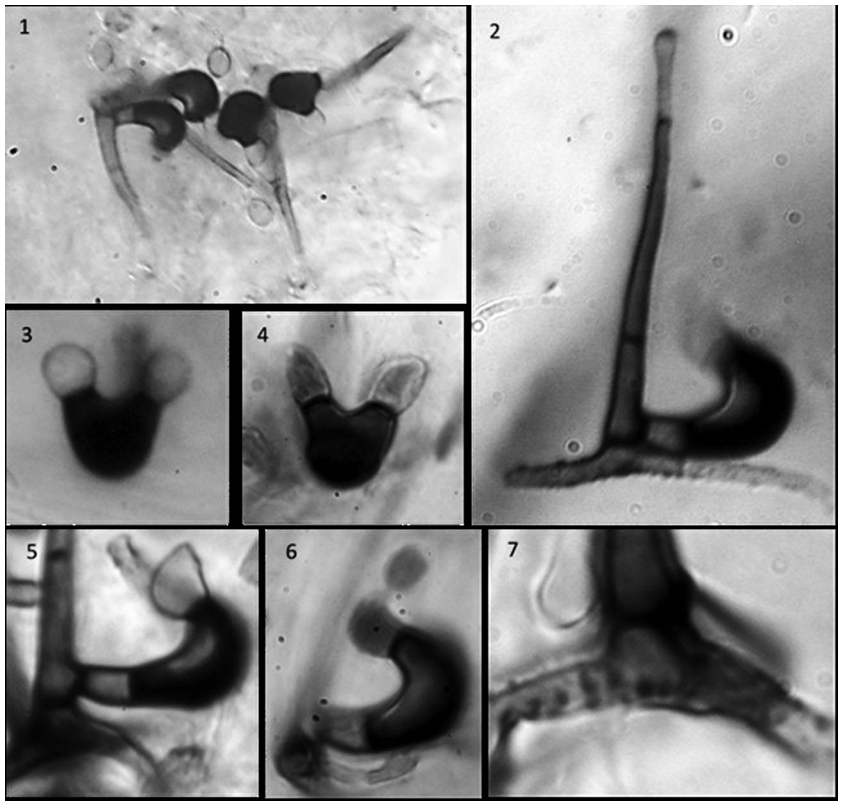
Differs from other *Zygosporium* species by its verrucose vegetative hyphae with warts that darken near setiform conidiophores; and from *Z. bioblitzi*, *Z. geminatum*, *Z. oscheoides*, and *Z. pacificum* by its smaller conidia.

Type: Venezuela, Miranda State, Municipio Guaicaipuro, Parroquia El Jarillo, Sector Quebrada Honda, 10°20′41″N 67°09′32″W, 1339 m a.s.l., on sepals of *Solanum lycopersicum* L., 17.XI.2015, coll. A. Vera, LL1112015 (**Holotype:** VEN 332005; **isotype**: CLL 1112015-2).

Etymology: From the Latin *verrucosum*, referring to the warts on the mycelium.

Colonies effuse on the natural substratum, forming an irregular shaped patch, amphigenous, brown. Mycelium superficial, decumbent. Hyphae 2–4 µm diam., hyaline, subhyaline to pale brown, cylindrical, septate, branched; with hyaline, pale brown to dark brown warts (<0.52 µm diam.), mostly near setiform conidiophores. Conidiophores setiform and vesicular, slightly curved, erect to flexuous, smooth, 2–3-septate; at the apical septum, brown, 42–57 × (2–)4–5 µm to 2–4 µm; apical cell clavate, hyaline to subhyaline, (4–)7–13 × 1–2 µm, basal cell dark brown, verrucose to tuberculate. Vesicles borne laterally on a short branch just above the conidiophore base, brown to darkish brown, thick, smooth, inflated, uncinate, 10–12 × 10–11 µm. Conidiogenous cells monoblastic, discrete, determinate, smooth, subhyaline to very pale brown, lageniform, ampulliform to globose, sometimes slightly curved, 4–6 × 4–5 µm. Conidia solitary, ellipsoidal, unicellular, smooth, hyaline, dry, subhyaline, 5–6 × 4–5 µm.

Comments—The most striking difference between *Z. verruciferum* and all other *Zygosporium* species is its warty dark hyphae, especially under the setiform conidiophores. No other species of the genus shows this character on the vegetative hyphae. *Zygosporium verruciferum* shares ellipsoidal conidia, two conidiogenous cells per vesicle, and setiform conidiophores with *Z. bioblitzi* McKenzie et al., *Z. geminatum* S. Hughes, and *Z. pacificum* Whitton et al., three species that are easily distinguished by their larger, ornamented conidia (Ellis



Figs 1–7. *Zygosporium verruciferum* (holotype, VEN 332005). 1. Conidiophores, vesicles, conidiogenous cells, and conidia. 2. Setiform conidiophore with vesicular conidiophore front view. 3–6. Vesicles and conidiogenous cells, vesicular conidiophore and conidia. 7. Conidiophore basal cell.

1971, McKenzie et al. 2007, Whitton et al. 2003). The new species produces conidia similar to *Z. oscheoides* Mont. (the generic type), which differs by its larger, ornamented conidia (8–13.5 × 6–8 μm) and its longer, narrower vesicular conidiophores (<18 × 7–9 μm; Hughes 1951, Whitton et al. 2003). Table 1 compares *Z. verruciferum* morphologically with *Z bioblitzi, Z. geminatum, Z. oscheoides,* and *Z. pacificum*.

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Table 1. *Zygosporium* species with ellipsoid conidia, two conidiogenous cells per vesicular conidiophore, and setiform conidiophores

Species	Conidia		Setae (from conidiophores: SC)		Vesicular conidiophores (VC)		Hyphal cell wall
	Morphology	Size (µm)	Morphology	Size (µm)	Morphology	Size (µm)	
Z. bioblitzi	Covered by brown, raised, flattened ornamentation; base truncate, protruding, cylindrical; brown	14–21 × 7.5–11	Brown; apical cell paler, obtuse	40–75 × 2–3	Brown; 1 per SC	8–10.5 × 7.5–11	Brown to hyaline; smooth
Z. geminatum	Tuberculate, verrucose, raised areas flattened; pale brown to brown	20–30 × 8–11	Dark brown; apex hyaline, clavate, sparsely echinulate, usually ending in a hyaline knob	65–110 × 3.5–5	Dark brown; arising from SC, 1 per SC	12–15 × 6–8	Brown to hyaline; smooth
Z. oscheoides	Smooth to minutely verruculose; hyaline to pale brown	8–13.5 × 6–8	Dark brown below; apex hyaline, clavate, smooth	30–60 × 3–4	Dark brown; arising from SC, 1 per SC	9–18 × 7–9	Brown to hyaline; smooth
Z. pacificum	Coarsely verrucose, with raised and flattened areas; pale brown	11–16 × 6.5–7.5	Dark brown below; apex hyaline, clavate, smooth	53–61 × 3.5–5	Dark brown; arising from SC, 1 per SC	19–28 × 8–12.5	Brown to hyaline; smooth
Z. verruciferum	Smooth; hyaline to subhyaline	5 × 4–5	Brown; apex hyaline to subhyaline, attenuate, clavate	42–57 × (2.4–)3.6–5	Brown to darkish brown; 1 per SC	9.6–12 × 9.6–11	Brown to hyaline; verrucose

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